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of *Abies excelsa* in the Erzgebirge.—I. URBAN (Bot. Jahrb. **45**:432-470. 1911) in co-operation with several specialists, under the title "Plantae novae andinae imprimis Weberbauerianae V," has published 72 new species of flowering plants from South America.—WOOD and FRANKS (Kew Bull. 274, 275. 1911) have published a new genus (*Siphonochilus*) of the Scitamineae from Natal.—H. F. WERNHAM (Journ. Bot. **49**:206-216. 1911) presents a revision of the American genus *Hamelia*, recognizing 27 species, of which one-third are characterized as new. The genus attains its greatest specific diversity in Mexico.—H. WOLFF (Rep. Nov. Sp. **9**:417-422. 1911) under the title "Umbelliferae Novae I" has published several new species and proposes the following new genera from Mexico: *Nematosciadium*, *Schiedeophytum*, and *Langlassea*.—N. WORONICHIN (Ann. Mycol. **9**:217-225. 1911) has characterized a new genus (*Physalosporina*) of the Pyrenomycetes. The genus, as at present understood, embraces 6 species having a distribution in the United States and Europe.—J. M. GREENMAN.

Biology of rusts.—The results of further studies on the biology of rusts are reported by FISCHER in two papers. The first one⁶ is a continuation of a series of former studies, and includes four additional forms: *Uromyces caryophyllinus* (Schränk) Winter on *Saponaria ocymoides* L. and *Euphorbia Gerardiana* Jacq.; *Gymnosporangium tremelloides* Hartig on *Juniperus communis* L., *Sorbus Aria* (L.) Crantz, *S. chamaemespilus* (L.) Crantz, and the hybrid forms *S. hybrida* Koch (*S. aucuparia* × *S. Aria*) and *S. latifolia* (Lam.) Pers. (*S. Aria* × *S. torminalis*); *Ochrospora Sorbi* (Oud.) Diet. on *Aruncus sylvestris* Kost. and *Anemone nemorosa* L.; and *Puccinia albulensis* P. Magn., a micro-*Puccinia* on *Veronica bellidiodides* L. and *V. aphylla* L.

The discovery that the teleutospore generation belonging to *Aecidium Euphorbiae Gerardianae* occurs on members of the Caryophyllaceae serves as an illustration of the proposition formulated by FISCHER that on the hosts bearing the aecidial generation of certain heteroecious rusts there occur also micro- and lepto-forms whose teleutospores resemble the teleutospores of the heteroecious forms in question. The aecidium on *Euphorbia Gerardiana* has generally been regarded as belonging to *Uromyces excavatus* (DC.) P. Magnus on the same host; but the close resemblance between the teleutospores of *U. excavatus* and those of *U. caryophyllinus* occurring on members of the pink family led TRANZSCHER to predict that the teleutospore form of *Aecidium Euphorbiae Gerardianae* would be found among the species of *Uromyces* parasitic on the Caryophyllaceae. The cultural work of FISCHER has shown the correctness of this prediction. It is probable that this resemblance, which has led to the discovery of the connection between aecidia and teleutospores in several cases, represents something more than a mere superficial similarity,

⁶ FISCHER, ED., Beiträge zur Entwicklungsgeschichte der Uredineen. Centralbl. Bakt. II. **28**:139-152. 1910.

and may be an indication of phylogenetic relationship between such heteroecious forms and the corresponding micro- and lepto-rusts. The cultural work with *Aecidium Euphorbiae Gerardianae* further showed that there exists a certain degree of specialization among the forms of *Uromyces caryophyllinus*, for of several members of the pink family *Saponaria* was the only one that could be infected by aecidiospores from *Euphorbia Gerardiana*.

Gymnosporangium tremelloides had therefore been experimentally connected only with the aecidium on *Sorbus Aria*, although *Aecidium penicillatum* Müller occurs on a large number of pomaceous plants. The present work adds to *Sorbus Aria* three new aecidial hosts, two of which are probably hybrids, with *S. Aria* as one parent. *Ochrospora Sorbi*, which occurs on various species of *Sorbus*, has been connected with *Aecidium leucospermum* by TRANZSCHEL, but the form on *Aruncus (Spiraea) sylvester* had not previously been connected with that aecidium.

In the second paper⁷ the author's studies on the biology of the forms of *Gymnosporangium* are continued. He finds that the *Roestelia cornuta* on *Sorbus torminalis* (L.) Crantz and *S. latifolia* (Lam.) Pers. has its teleutospores on *Juniperus communis* L. The small cushion-like sori occur on the leaves and resemble those of *Gymnosporangium juniperinum* L. The new form is distinct from both *G. juniperinum* and *G. Amelanchieris*, however, as neither of these produce aecidia on *Sorbus torminalis* and *S. latifolia*. The author proposes the name *G. tormanili-juniperinum* for it.

Cultures with *Gymnosporangium juniperinum* extend the list of aecidial hosts of this species to include *Sorbus americana* DC. and *S. hybrida* Koch, in addition to *S. aucuparia* L., which was previously known. On account of the successful infection of *Sorbus americana*, the author suggests that this form is identical with the form occurring on *Juniperus Sibirica* Burgsd. (*J. nana* Willd.) in America, as the American form was shown by ARTHUR to have aecidia of the *cornuta*-type on *Sorbus americana*. The American form is called by ARTHUR *S. cornutum* (Pers.) Arthur.

Further cultures with teleutospores of *Gymnosporangium Amelanchieris* show that this form does not infect *Aronia nigra* Kochne, and is therefore not identical with *G. Davisii* Kern, which has aecidia of the *cornuta*-type on *Aronia nigra*. In conclusion, the author points out the fact that often hybrids of an immune and a susceptible species are susceptible. This condition, however, is not universally true.

TRANZSCHEL⁸ reports the following results of cultures made in the years 1906 and 1907. *Puccinia Porri* (Sw.) Winter, sown on its host *Allium Schoenoprasum* L., produced uredinia and telia directly, without first forming spermagonia or aecidia. This rust, therefore, is a true hemi-*Puccinia*, and the

⁷ FISCHER, ED., Studien zur Biologie von *Gymnosporangium juniperinum*. Zeitschr. Bot. 2:753-764. 1910.

⁸ TRANZSCHEL, W., Beiträge zur Biologie der Uredineen. III. Travaux Musée Bot. Acad. Imp. Sci. St. Pétersbourg 7:1-10. 1910.

existence of true hemi-forms is thus definitely demonstrated. *Aecidium Ligulariae* Thüm. on *Ligularia Sibirica* Cass. was connected with *Puccinia Eriophori* Thüm. on *Eriophorum angustifolium* Roth. *Senecio paluster* DC. was also shown to be an aecidial host for this form. *Puccinia litoralis* Rostr. was shown to have aecidia on *Sonchus oleraceus* L., *S. asper* Vill., and *S. arvensis* L. *Puccinia Dietrichiana*, described as new, on *Agropyrum caninum* P.B., was connected with *Aecidium Trolli* Blytt on *Trollius europaeus* L. Two forms on species of *Carex* were connected with aecidia on species of *Centaurea*. These are *Puccinia Jacea-leporinae* on *Carex leporina* L. and *Centaurea Jacea* L.; and *Puccinia Jacea-capillaris* on *Carex capillaris* L., *Centaurea Jacea* L., and *C. nigra* L. A third form on *Carex gynobasis* Vill. was found among aecidia-bearing plants of *Centaurea orientalis* L. These and other known forms, whose alternate hosts are species of *Carex* and *Centaurea*, the author proposes to unite under the collective name *Puccinia Centaureae-Caricis*. The different forms are closely restricted to their respective host species. *Lepidium Draba* L. and *Cleome spinosa* Jacq. were added to the known aecidial hosts of *Puccinia Isiacae* (Thüm.) Winter. Successful sowings of that species were also made on *Nasturtium palustre*, *Thlaspi arvense*, *Stellaria media*, *Galeopsis Tetrahit*, and *Raphanus sativus* L. *Puccinia Caricis* (Schum.) Rebout on *Carex pallescens* L. produced aecidia on *Urtica dioica* L. The same species on *Carex vaginata* Tausch. produced aecidia on *Urtica dioica* L. and *U. magellanica* Juss. *Carex pallescens*, *C. vaginata*, and *Urtica magellanica* are new hosts for *Puccinia caricis*. *Puccinia Maydis* Bering produced aecidia on *Oxalis stricta* L. and *O. cormiculata* L. *Puccinia Poarum* Nielson on *Poa nemoralis* L. var. *firma* Gaud. produced aecidia on *Tussilago Farfara* L., but not on *Petasites officinalis* Moench. The aecidium on *Petasites officinalis*, therefore, which has been associated by several authors with *Puccinia Poarum*, does not belong to that rust. New cultures with *Uromyces Rumicis* Winter on *Rumex obtusifolius* again showed that this rust has its aecidium on *Ficaria*, which is also the aecidial host for other species of *Uromyces*. A form of *Uromyces Dactylidis* Otth. was successfully sown on *Ranunculus repens* L. and *R. bulbosus* L., on both of which aecidia were produced. A number of cultures of *Puccinia Veratri* Duby, *P. glumarum* (Schmidt) Erikss. and Henn., *P. Iridis* (DC.) Wallr., and *P. oblongata* (Link) Winter gave negative results.

In Japan, ORISHIMO⁹ has shown that *Peridermium Pini-densiflorae* P. Henn., common there on the leaves of *Pinus densiflora*, belongs to the species of *Coleosporium* on *Aster scaber* Thunb. Six other species of *Aster* on which species of *Coleosporium* occur were not infected by aecidiospores of this *Peridermium*. The form is separated as *Coleosporium Pini-Asteris*.

For students of the Uredinales, attention should be called to FISCHER's review¹⁰ of work done on the biology of rusts in 1909.—H. HASSELBRING.

⁹ ORISHIMO, Y., On the genetic connection between *Coleosporium* on *Aster scaber* and *Peridermium Pini-densiflorae* P. Henn. Bot. Mag. Tokyo 24: 1-5. 1910.

¹⁰ FISCHER, ED., Die Publication über die Biologie der Uredineen im Jahre 1909. Zeitschr. Bot. 2: 332-337. 1910.